M008	**Financial and Actuarial Mathematics**	L	P	S	ECTS
		2	2	0	5

Course objectives. In lectures and exercises, students will be acquainted with basic terms, symbols and principles of financial and actuarial mathematics. Fundamental techniques of financial mathematics will also be demonstrated to students, with examples and application in everyday business situations.

Prerequisites. The materials from previous years of mathematical study.

Course content.

1. The idea of interest. Simple and compound interest. Accumulation factors. The effective and nominal rate of interests. The force of interest. Present values. Present values of cash flows. Valuing cash flows.
2. Interest income. The rate of discount. The equation of value and the yield on a transaction. Annuities-certain: present values and accumulations. Deffered, increasing and continously payable annuities. The loan schedule for equal annuities. Interest payable more frequently than once a year. Annuities payable more frequently than once a year and annuities payable in intervals greater than year. Discounted cash flows and capital redemption policies.
3. Survival models. The force of mortality. Estimation of mortality. Some simple laws of mortality. Select and ultimate mortality tables.
4. Pure endowments. Life annuities (whole life, temporary and deferred). Present values and accumulation. Net and office premiums. Life annuities payable more frequently than once a year. Policy values.

LEARNING OUTCOMES

No.	LEARNING OUTCOMES
1.	Differentiate between a simple and a compound interest.
2.	Use certain rates of interests (effective, nominal, discount) in calculations in financial mathematics.
3.	Calculate (by means of computers) and interpret present values of cash flows, financial annuities, loan schedules and interest payment in applications.
4.	Analyse mortality tables and estimate the probability of survival by problems of insurance.
5.	Calculate present values and accumulations, and premiums by pure endowments, life annuities, life assurance, on examples from practice.
6.	Recognize conditions by net and office premiums, and calculate their amounts on examples of practical business situations.

RELATING THE LEARNING OUTCOMES, ORGANIZATION OF THE EDUCATIONAL PROCESS AND ASSESSMENT OF THE LEARNING OUTCOMES

TEACHING ACTIVITY	ECTS	LEARNING OUTCOME **	STUDENT ACTIVITY*	EVALUATION METHOD	POINTS	
					min	max
Attending lectures and exercises	0,5	1-6	Lecture attendance, discussion, team work and	Attendance lists, tracking activities	0	4

			independent work on given tasks			
Homework	0,5	1-6	Solving theoretical and practical problems	Evaluation	0	4
Written exam (Mid-terms)	2	1-6	Preparing for written exam	Evaluation	25	46
Final exam	2	1-6	Revision	Oral exam	25	46
TOTAL	5				50	100

Teaching methods and student assessment. Lectures and exercises are obligatory. The examination consists of a written and an oral part, and one takes the exam upon the completion of lectures and exercises. Acceptable mid-term exam scores replace the written examination. Students can influence their final grades by writing homework or making seminar during the semester.

Can the course be taught in English: Yes

Basic literature:

1. H.U. Gerber, Life Insurance Mathematics, Springer-Verlag Berlin Heidelberg and Swiss Association of Actuaries, Zürich, 1990.

Recommended literature:

1. S. A. Broverman, Mathematics of Investment and Credit, ACTEX Learning, N.ew Hartford, 2017.
2. D. Dickson, M. Hardy, H. Waters, Actuarial Mathematics for Life Contingent Risks, Cambridge University Press, New York, 2013.
3. D. Bakić, D. Franciśković, Financijska i aktuarska matematika, Odjel za matematiku Sveučilište J. J. Strossmayera u Osijeku, 2013, skripta.
4. R. N.L. Bowers, H.U. Gerber, C.H. James, A.J. Donald, J.N. Cecil, Actuarial Mathematics. Second edition. The Society of Actuaries, 1997.
5. A. Charpentier (editor), Computational actuarial science with R, CRC press, 2014.
6. J.J. McCutcheon, W.F. Scott, An Introduction to the Mathematics of Finance, Institute and Faculty of Actuaries, Butterworth - Heinemann, 1986.
7. A. Neill, Life contingencies, Heinemann, 1977.
8. B. Šego, Z. Lukač, Financijska matematika, RRIF – plus, Zagreb, 2011.